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Blackeye Goby *Rhinogobiops nicholsii* and Kelp Perch
Brachyistius frenatus in Southeastern Alaska**

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ABSTRACT: Blackeye goby *Rhinogobiops nicholsii* (Bean 1882) and kelp perch *Brachyistius frenatus* (Gill 1862) were caught or observed from April to September 1998 and 1999 with beach seines and a remotely operated vehicle at 20 locations near Sitka, Craig, and Klawock in southeastern Alaska. This is the first verified account of blackeye goby (Gobiidae) and kelp perch (Embiotocidae) in Alaska. We captured blackeye gobies as far north as lat 57°17'26"N, long 135°35'14"W, near Sitka, and kelp perch at lat 55°34'38"N, long 133°05'42"W, near Klawock; these may be the northern range limits for these species. Blackeye gobies were found in greater ranges of temperature (9.5° to 17.0°C) and salinity (13 to 27 on the Practical Salinity Scale) than kelp perch (10.0° to 13.2°C, salinity 22 to 28). Specimens of both species have been deposited and cataloged in the Auke Bay Laboratory fish collection.

INTRODUCTION

Nearshore marine teleosts of southeastern Alaska are described in field guides and faunal surveys (Clemens and Wilby 1961; Quast and Hall 1972; Hart 1973; Eschmeyer et al. 1983; Kessler 1985; Humann 1996; McConnaughey and McConnaughey 1998). According to these surveys, the northern range limit for the blackeye goby *Rhinogobiops nicholsii* and kelp perch *Brachyistius frenatus* is northern British Columbia. Accounts of the distribution of nearshore marine fishes are limited because geographic ranges extend across unsampled or sparsely sampled areas. The nearshore marine environment of southeastern Alaska, with over 1,000 islands and 24,135 km of shoreline, supports a diverse ichthyofauna. Nearshore marine fishes like the blackeye goby and kelp perch have received little, if any, detailed study.

Blackeye gobies and kelp perch were caught in 1998 and 1999 north of their published ranges during a National Marine Fisheries Service Essential Fish Habitat study of nearshore habitats in southeastern Alaska. This report provides site coordinates, collection dates, specimen sizes, and habitat descriptions.

METHODS

Sample Locations

Nearshore marine fishes were sampled at 132 sites in southeastern Alaska near Craig in the south to near Juneau in the north and west to Soapstone Cove in Lisianski Inlet. Samples were collected from April through September in 1998 and from May through July in 1999 (Figure 1). Sample sites on the outer coast of southeastern Alaska were located between Port San Antonio (lat 55°21'27"N, long 133°35'08"W) near Craig and St. John Baptist Bay (lat 57°17'26"N, long 135°35'14"W) near Sitka, plus several sites in Lisianski Inlet (lat 58°06'00"N, long 136°29'18"W), and Port Althorp. Environmental conditions along the outer coast are more stable throughout the year and the shoreline is less protected. We also sampled inside waters in Stephens Passage, Frederick Sound, and Lynn Canal where environmental conditions fluctuate more throughout the year and the shoreline is more protected (Pickard 1967; Pickard and Emery 1990). Several sites were sampled in more protected waters in Saginaw Bay, Ushk Bay, Funter Bay, Gastineau Channel, Auke

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Bay, Lynn Canal, Bridget Cove, Echo Cove, and Neka Bay. Sites near Craig and Klawock were sampled in April, May, June, and September 1998, and in July 1999. Sites in St. John Baptist Bay, Nakwasina Sound, Katlian Bay, and Silver Bay were sampled in May and August 1998. Biorka Island, Goddard Hot Springs, Ushk Bay, Sitkoh Bay, and Tenakee Inlet sites were sampled once in August 1998; Funter Bay was sampled in August 1998 and 1999. Gastineau Channel, Bridget

Cove, Cowee River, and Echo Cove sites were sampled monthly from April to September 1998. Sandy Cove, Pirates Cove, Middle Island, and Katlian Bay were sampled monthly from April through August 1999.

Specimen and Habitat Data Collection

Beach seines were used to collect fish and a remotely operated vehicle (ROV) equipped with an underwater

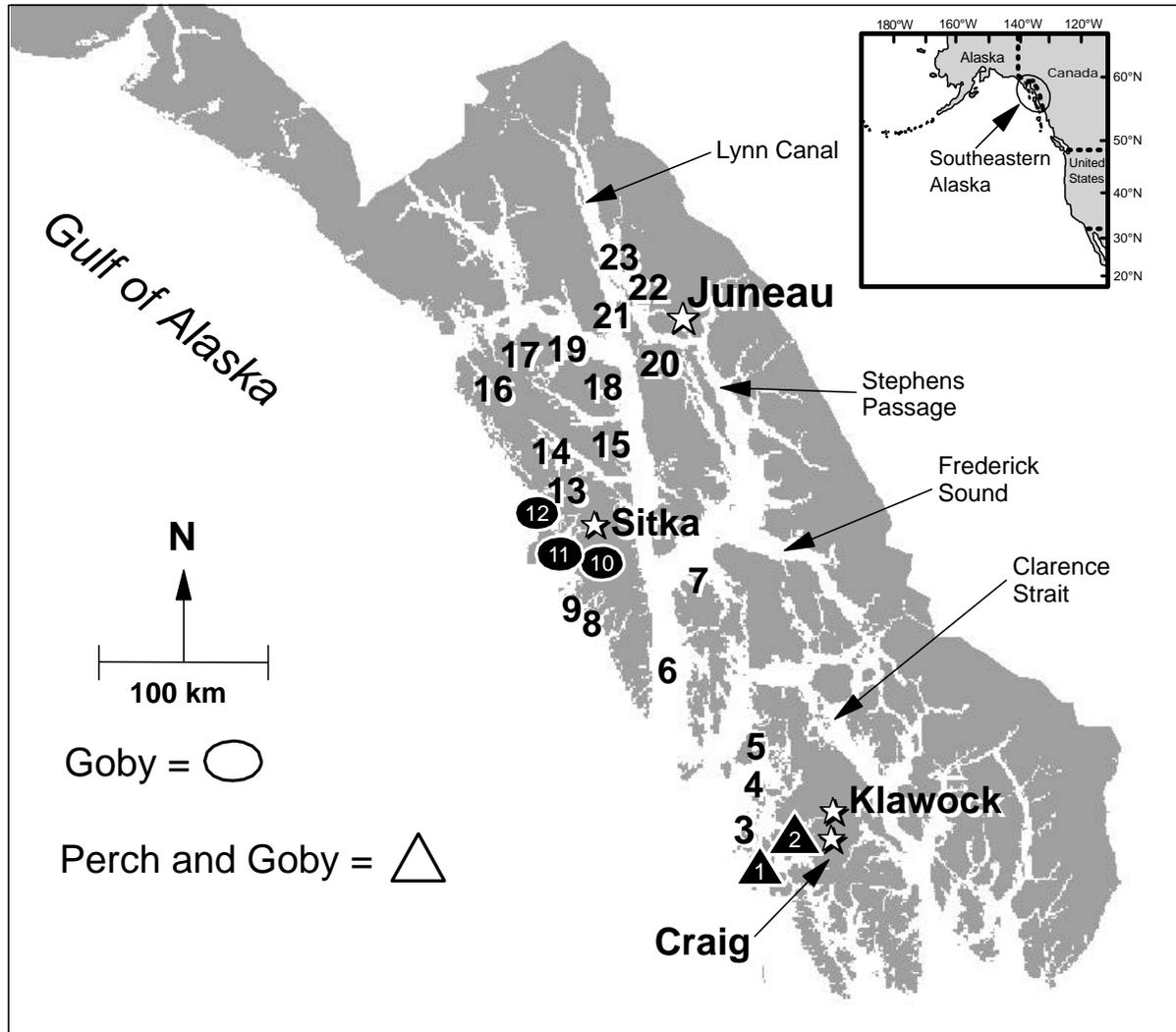


Figure 1. Sites sampled for nearshore marine fishes in southeastern Alaska in 1998 and 1999. General site locations are numbered 1–23, these locations include all 132 sample sites. Sites where both blackeye goby *Rhinogobiops nicholsii* and kelp perch *Brachyistius frenatus* were caught are marked with triangles, and sites where only gobies were caught are marked with ovals. 1 = Port San Antonio; 2 = Klawock Inlet, and Fish Egg, False, Cole, East Ballena, and Alberto Islands; 3 = Port Bagial; 4 = Tonowek Bay; 5 = Warm Chuck Inlet; 6 = Port Conclusion and Port Walter; 7 = Saginaw Bay; 8 = Biorka Island and Goddard Hot Springs; 9 = Deep Inlet, Aleutkina Bay, Eastern Channel, and Pirates Cove; 10 = Silver Bay and Sandy Cove; 11 = Katlian Bay and Middle Island; 12 = St. John Baptist Bay; 13 = Nakwasina Sound; 14 = Ushk Bay; 15 = Sitkoh Bay; 16 = Soapstone Cove, Mite Cove, and Lisianski Inlet; 17 = Port Althorp; 18 = Tenakee Inlet; 19 = Neka Bay and Neka Island; 20 = Funter Bay; 21 = Skull Island and Vanderbilt Reef; 22 = Gastineau Channel and Auke Bay; 23 = Bridget Cove, Cowee River delta, and Echo Cove.

Table 1. Coordinates and habitat descriptions of sites where blackeye goby *Rhinogobiops nicholsii* and kelp perch *Brachyistius frenatus* were captured with beach seines or observed from a remotely operated vehicle in southeastern Alaska in 1998 and 1999 (sites 18–20 were added in 1999). Site locations are shown in Figure 1. Percent composition of vegetation and substrate were qualitative observations.

Site	Capture Sites	Latitude (N)	Longitude (W)	<i>n</i>		Substrate and vegetation ^a
				Goby	Perch	
1	Klawock Inlet - 1	55°34'38"	133°05'42"		3	organic silt; eelgrass
2	Klawock Inlet - 2	55°31'58"	133°06'43"		2	cobble 80%, gravel 20%; algae
3	Fish Egg Island	55°30'03"	133°10'02"	10	4	gravel 80%, cobble 20%; algae
4	Klawock Inlet - 3	55°30'26"	133°08'02"	7	8	cobble 100%; sugar wrack
5	Klawock Inlet - 4	55°30'45"	133°07'47"	15	9	cobble 90%, gravel 10%; sugar wrack
6	False Island - 1	55°29'12"	133°08'12"	3		gravel 80%, cobble 20%; eelgrass
7	False Island - 2	55°29'12"	133°08'31"		3	gravel and sand 70%, cobble 30%; eelgrass
8	Cole Island	55°30'00"	133°09'52"	1		organic silt 80%, sand 20%; eelgrass
9	East Ballena Island	55°28'55"	133°11'17"		4	cobble 80%, gravel 20%; kelp
10	Alberto Island	55°31'44"	133°11'24"		2	bedrock; kelp
11	Katlian Bay - 1	57°09'38"	135°20'31"	35		cobble 80%, gravel 20%; dense algae, sugar wrack
12	Katlian Bay - 2	57°09'38"	135°20'31"	35		cobble 80%, gravel 20%; dense algae, sugar wrack
13	Katlian Bay - 3	57°09'50"	135°19'46"	1		bedrock wall; rockweed
14	Katlian Bay - 4	57°10'38"	135°18'28"	1		landslide talus; slight eelgrass, rockweed, dense algae
15	Katlian Bay - 5	57°09'46"	135°18'50"	1		gravel 100%; eelgrass
16	Silver Bay ^b	56°59'50"	135°09'52"	20		bedrock 80%, cobble 20%; no flora
17	St. John Baptist Bay	57°17'26"	135°35'14"	1		bedrock; kelp
18	Port San Antonio	55°21'27"	133°35'08"	12	1	cobble 80%, gravel and sand 20%; eelgrass
19	Sandy Cove	56°58'50"	135°18'40"	11		cobble 90%, organic silt 10%; sugar wrack
20	Middle Island	57°05'25"	135°27'20"	4		cobble 80%, sand and silt 20%; sugar wrack
TOTALS				157	36	

^a Eelgrass is *Zostera marina*, rockweed is *Fucus gardneri*, kelps are *Nereocystis* spp. and *Macrocystis* spp., sugar wrack is *Laminaria saccharina*. All other algae found were predominately filamentous green and brown algae (e.g., *Cladophora* spp. and *Pilayella* spp.).

^b ROV observation.

video camera was used to observe fishes and their habitat. A total of 314 beach seine hauls and 151 ROV dives were made from April to September 1998 and 1999 throughout southeastern Alaska. Two types of beach seines were used depending on beach slope: a 37-m beach seine for slopes $\leq 20\%$, and a beach seine modified for cliff seining was used for slopes $> 20\%$ (Orsi et al. 1991). Both types of seines were set using a "round haul" technique. One end of the seine was held on the beach, and the opposite end was attached to a skiff. The skiff would back out perpendicular from shore for approximately 20 m before moving parallel to shore until the entire net was out. We would then head for shore, forming an arch, closing the seine 18 m from the starting point; the seine was pulled to shore by hand. Sampling depth was 0–3 m. All sampling occurred diurnally within 2 hours of low tide, 0–1.5 m below mean lower low water (MLLW). Biota and benthic habitat were observed with an ROV and recorded on Hi-8 videotape. Substrate type was determined qualitatively. We made 51 dives with the ROV in 1998 and 100 dives in 1999. We observed and re-

corded biota and habitat at depths ranging from 0 to 85 m for 5–35 minutes per ROV dive.

Habitat data included beach slope, water depth, turbidity, temperature, salinity, geographic coordinates, substrate, and flora. Beach slope was measured with a clinometer and was used to determine which seine should be used. Water depth was determined with a depth sounder. Turbidity was determined visually as clear, turbid (light sediment in water column), or opaque (heavy sediment in water column). Temperature and salinity were measured at a depth of 30 cm with a thermometer and hand-held refractometer. Geographic coordinates for each site were fixed using a hand-held global positioning system (GPS; accuracy ± 100 m). Substrate and vegetation were qualitatively described for each site blackeye gobies and kelp perch were found (Table 1).

Preliminary identifications of fish were made in the field, and those identifications were verified later at Auke Bay Laboratory (ABL). Twelve blackeye gobies and 4 kelp perch were relocated to ABL for identification, storage, and cataloging (Table 2). Taxonomic

Table 2. Collection date, site number, number of specimens, total length, and catalog number for blackeye goby *Rhinogobiops nicholsii* and kelp perch *Brachyistius frenatus* in the Auke Bay Laboratory permanent collection. See Table 1 and Figure 1 for site locations.

Collection Date	Site	<i>n</i>	Total Length (mm)	Catalog number	
Blackeye Goby:					
1998	May	3	2	44, 52	AB98-57
		12	4	40, 41, 43, 45	AB98-51
	June	3	2	52, 53	AB98-62
		4	2	68, 86	AB98-64
		5	1	100	AB98-65
		17	1	55	AB98-70
Kelp Perch:					
1998	May	3	1	69	AB98-57
		3	1	88	AB98-64
	June	5	1	83	AB98-65
		4	1	85	AB99-6

keys (Wilimovsky 1958; Clemens and Wilby 1961; Miller and Lea 1972; Hart 1973; Eschmeyer et al. 1983; Lamb and Edgell 1986; Gotshall 1989) were used to identify specimens (Figures 2 and 3).

RESULTS

A total of 157 blackeye gobies and 36 kelp perch were collected with beach seines and observed with an ROV from April through September 1998 and April through August 1999 at 20 locations in southeastern Alaska. Blackeye gobies and kelp perch were found in eelgrass *Zostera marina*, kelp (*Nereocystis luetkeana*, *Macrocystis integrifolia*, and *Laminaria* spp.), rockweed *Fucus gardneri*, and small filamentous green and brown algae (e.g., *Cladophora* spp. and *Pilayella* spp.). Substrates found at these sites included organic silt, sand, gravel, cobble, and bedrock (Table 1). Shiner perch *Cymatogaster aggregata* were the most common surfperch captured during our sampling.

Blackeye Goby

We captured or observed blackeye gobies in 37 seine hauls (1–15 per haul) at 15 locations (Table 1). In 1998, 27 gobies were caught at 5 sites near Craig and Klawock, 32 were caught at 6 sites in Katlian Bay and St. John Baptist Bay, and approximately 20 gobies were observed with the ROV in Silver Bay at a depth of 12.2 m. In 1999, 42 gobies were caught in Katlian Bay, 11 in Sandy Cove, 4 on Middle Island, and 21 at 3 sites near Craig. Total lengths of these fish ranged from 40 to 100 mm, with a mean length of 56.6 mm. Water temperature ranged from 9.5° to

17.0°C, and salinity from 13 to 27. Water was usually clear, but turbid or opaque conditions were observed in 6 of 17 hauls during windy days. In 1998 6 live specimens were relocated to ABL and placed in aquaria; all became lethargic, stopped eating, and died soon after the water temperature reached 3.8°C. In July 1999, 6 gobies were caught in Klawock Inlet and relocated to ABL aquaria for future observation. These fish were held in temperatures ranging from 4° to 12°C with a little lethargy observed at 4°C, and no mortality to date. Attempts were not made to lower the temperature further than 4°C, and only one specimen was subjected to temperatures lower than 6°C. St. John Baptist Bay was the northernmost location where blackeye gobies were caught; it may be the northern limit for this species of goby in Alaskan waters.

Kelp Perch

We captured 36 kelp perch in 18 seine hauls (1–5 fish per haul) at 9 locations near Craig and Klawock in May, June, and August 1998 and July 1999. In July 1999, 4 kelp perch were caught in Klawock Inlet and relocated to ABL aquaria for observation. All specimens died when water temperatures reached 8°C. Total lengths of kelp perch ranged from 43 to 88 mm; the mean length was 65.5 mm. Water temperature ranged from 10.0° to 13.2°C, and salinity was 22 to 28. Water was predominately clear, with opaque conditions occurring only twice on windy days.

The northernmost location where kelp perch were captured was the northern end of Klawock Inlet; this may be the northern limit for this species. No kelp perch were found outside the Craig/Klawock area (Figure 1; Table 1).



Figure 2. Photograph of an adult blackeye goby *Rhinogobiops nicholsii* caught in Klawock Inlet in June 1998.



Figure 3. Photograph of an adult kelp perch *Brachyistius frenatus* caught in Klawock Inlet in June 1998.

(Color photos available at <http://www.state.ak.us/adfg/geninfo/pubs/afrb/afrbabst.htm>.)

DISCUSSION

The blackeye goby is a member of the largest family of marine fishes (Gobiidae), with 200 genera and 1,500–2,000 extant species (Eschmeyer et al. 1983). Gobies are mainly tropical with only a few species extending into temperate waters of British Columbia, Canada. The northernmost range for blackeye goby previously published was Wales Island in northern British Columbia, lat 54°43'N, long 130°29'W (Peden and Wilson 1976). The blackeye goby is the only gobiid currently reported in Alaskan waters. Two other gobiids, the arrow goby *Clevelandia ios* and the bay goby *Lepidogobius lepidus*, are found in northern British Columbia (Clemens and Wilby 1961; Hart 1973; Eschmeyer et al. 1983). The blackeye goby is distinguished from its relatives by large scales, a firm fleshy head crest, and a predominant black edge on the anterior dorsal fin. Positive identification of blackeye gobies captured in St. John Baptist Bay extends the species' northern range by approximately 300 km. The observed mortality of fish in aquaria at low temperatures could explain why gobies are not found north of St. John Baptist Bay where winters are colder (Williamson 1965; Jones 1978). The deaths of 6 blackeye gobies in the ABL aquaria at 3.8°C may have been caused by low temperatures because no disease, infection, or infestation was found.

The kelp perch, members of the family Embiotocidae, are commonly referred to as surfperch or seaperch (Clemens and Wilby 1961; Hart 1973). The embiotocids are viviparous fishes found only along the temperate north Pacific coast. Three embiotocids are found in Alaskan waters: shiner perch *Cymatogaster aggregata*, striped perch *Embiotoca lateralis*, and pile perch *Rhacochilus vacca* (Eschmeyer et al. 1983; Lamb and Edgell 1986). Ours is the first published account of kelp perch caught in Alaska. The kelp perch is distinguished from its relatives by its thick caudal peduncle, frenum, lack of body markings, and small eye. The previously published northern range for kelp perch was Welcome Harbor on Porcher Island, northern British Columbia (lat 53°56'N, long 30°39'W; Peden and Wilson 1976); positive identification of several specimens captured in Klawock Inlet extends their northern range by 135 km. The observed mortality of fish in aquaria at low temperatures could explain why kelp perch are not found north of Klawock Inlet where winters are colder (Williamson 1965; Jones 1978). The death of 4 kelp perch in the ABL aquaria at 8°C may have been caused by low temperatures because no disease, infection, or infestation was present.

Blackeye gobies are found in sandy areas near rocks, and kelp perch are associated with kelp or docks (Clemens and Wilby 1961; Eschmeyer et al. 1983; Humann 1996; and McConnaughey and McConnaughey 1998). However, we found blackeye gobies associated with vegetation and coarse substrate like cobble; only 20% of their sites had sand (Table 1). During an ROV dive in Silver Bay, gobies were observed widely scattered on the bottom, within or close to crevices between cobbles. Blackeye gobies were associated with vegetation and rocky habitats, which provide refuges in crevices, usually on the bottom. Kelp perch were associated with vegetation with cobble or gravel substrates; 44% of their sites had some type of kelp, and 56% had eelgrass or filamentous algae, or both (Table 1). No kelp perch could be positively identified from the ROV because it was difficult to distinguish surfperch species with the ROV. However, we observed surfperch schools in the water column near vegetation, usually close to the surface, at depths of 0.5–12 m. Surfperch were found close to the surface and were associated with sheltering vegetation.

The biogeography of southeastern Alaska is strongly influenced by 2 environmental gradients: an inshore–offshore salinity gradient and a north–south thermal gradient (Williamson 1965; Jones 1978). Inside waters are more estuarine, more protected from wave action, and have more extreme seasonal temperature and salinity changes than outside waters. Outside waters are less affected by freshwater runoff, less protected from wave action, and have more stable temperatures and salinities (Pickard 1967; Pickard and Emery 1990). This pattern divides the shallow-water marine biota into outside and inside groups. The inside waters are further divided by a partial climatic barrier into northern and southern components by shallows between Kuiu, Kupreanof, and Mitkof Islands (Quast 1968). All sites where blackeye gobies and kelp perch were caught are considered outside waters. Environmental differences between inside and outside waters could limit the ranges of these fishes to outer Alaskan waters.

We sampled inside and outside waters of Baranof and Chichagof Islands, inside waters around Juneau, and outside waters of Prince of Wales Island. Our sampling established the northern limits of kelp perch and blackeye goby for outside waters. Sites near Tonowek Bay, Warm Chuck Inlet, and Sitka were extensively sampled and no kelp perch were caught, indicating Klawock Inlet is probably their northern limit. Sites north of St. John Baptist Bay in inside and outside

waters were sampled, and no blackeye gobies were caught, indicating that St. John Baptist Bay is probably their northern limit. To determine whether St. John Baptist Bay and Klawock Inlet are indeed the true northern limits for blackeye goby and kelp perch, respectively, additional sampling is required in the inside waters of Stephens Passage, Frederick Sound, and Clarence Strait.

Neither species appears to migrate (Clemens and Wilby 1961; Miller and Lea 1972; Hart 1973; Eschmeyer et al. 1983; Lamb and Edgell 1986; and

Humann 1996); their small body size suggests limited migration, if any, and indicates blackeye gobies and kelp perch are resident species and not seasonal migrants or transients. The sizes of our specimens indicate the fishes were adults and juveniles; some of the larger male gobies were close to breeding condition.

Our fishes are the first documented and verified specimens of these species in Alaska. The range of blackeye goby has been extended 300 km north and the kelp perch range has been extended 135 km north of their previously published ranges.

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